CHALLENGES IN IMPLEMENTING A NICT PLAN IN THE CONGO

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Abstract

Over the years, Information and Communication Technologies (ICT) have been credited with changing the social, economic, and political landscapes of several nations across the globe. Despite widespread adoption of ICT as engines for sustainable development by many industrialized nations, several African countries have yet to fully embrace these tools. The Democratic Republic of Congo (DRC) is one of the countries which has not yet implemented a comprehensive, strategic ICT plan. This may explain the paradox of this extremely poor country with innumerable mineral wealth in the heart of Africa. This paper makes a critical appraisal of some of the challenges which prevent this country from developing effective and efficient ICT capabilities. While reviewing factors hampering the implementation of a National Information and Communication Technology (NICT) plan, this literature review showcases the enormous potential for ICT to transform this vast country and examines annotated references used to investigate this topic.

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Introduction

There is a vast array of literature which supports the view that cost-effective utilization of Information and Communication Technology (ICT) may contribute to social and economic development and improve educational goals in developing countries. Torero and Braun (2006) describe the benefits of ICT in these terms: “ICT has the potential to accelerate growth, create jobs, reduce migration pressure from rural to urban areas, increase agricultural and industrial productivity, increase services and access to them, facilitate the diffusion of innovations, increase public administration efficiency and the effectiveness of economic reforms, strengthen competitiveness in developing countries, and encourage greater public participation and democracy” (p. 1).

Several researchers recognize the social and economic benefits that ICT can bring to developing countries. Jun (2005), Yahya (1993), and Unwin (2009) are among those experts. According to the United Nations, several countries around the world are now aware of the potential of ICT as a tool for social and economic development. UN experts have been involved in examining the impact of ICT for development. In fact, the UN held a number of trade and development conferences on this theme; the last one took place in Geneva between May 18 and May 22, 2009. It recommended that governments monitor and benchmark progress in ICT and measure the impact of ICT in order to allow their countries to reap the benefits of the rapidly changing information society (The Global Information Society: a Statistical View, 2008).

For Africa, the United Nations Economic Commission adopted in 1996 a platform as the basis of its work on promoting ICT as a motor of growth in the continent. The platform is known

as The African Information Society Initiative (AISI). According to The Global Information Society: a Statistical View (2008), "Currently, reliable statistical indicators for collecting and compiling data on the impact of ICT in Africa are scarce because most African nations lack basic information on key ICT and related economic and social indicators." (p. 17)

As can be noted, many African countries including the Democratic Republic of Congo (DRC) have not embraced ICT yet, despite the fact there is an abundant body of literature that attests that cost-effective utilization of ICT can harness development and economic growth.

Formerly known as Zaire, the Democratic Republic of Congo is one of the wealthiest countries in the world in terms of natural resources. Paradoxically, it is one of the poorest countries in the world in terms of per capita gross national product, standards of living, and infant mortality rate. Despite all its mineral resources, this country is in a state of disarray. Ayittey (1998) portrays it in realistic terms: "Zaire should be a prosperous country; it is blessed with vast mineral deposits and rich agricultural lands in the fertile Congo basin. But arrant misrule and plunder have reduced it to tatters." (p.47)

In conjunction with the United Nations Economic Commission for Africa (UNECA), the Democratic Republic of Congo tried unsuccessfully to implement a National Information and Communication Infrastructure (NICI) plan in 2004. Why did the project fail? What challenges does the implementation of an ICT plan face in DRC? The purpose of this paper is two-fold: First and foremost, to show that ICT can indeed be a tool for social and economic development in DRC. Secondly, to examine some of the many challenges that DRC may face while trying to implement a national ICT plan.

Definition

Under the umbrella of Information and Communication Technologies, several technologies have been incorporated. These include: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on as well as the various services and applications associated with them such as videoconferencing and distance learning (Unwin, 2009, p. 77).

Information and Communication Technologies have various dimensions. Within the framework of this work, I will adopt the definition provided by Torero and Braun (2006). ICT includes "the computing industry (hardware, software, networks, the Internet, and related services); electronic data processing and display (such as photocopiers, cash registers, calculators, and scanners, as well as a myriad of less well-known machines specifically tailored to production and manufacturing); telecommunications and related services (such as fixed and cellular telephones, facsimile machines, instant messaging, teleconferencing, and so on.); and audiovisual equipment and services (including television, radio, video, DVDs, digital cameras, compact discs, MP3 players, and so on" (p. 3).

In other words, ICT encompasses both equipment and services. It consists of hardware, software, networks, and media for collection, storage, processing, transmission, and presentation of information.

Country Profile

Third largest country in Africa, the Democratic Republic of Congo lies in the heart of Africa. With its 2,345,410 square km, about the size of the U.S. east of the Mississippi, it shares its borders with nine countries namely Angola, Burundi, Central African Republic, Republic of the Congo, Rwanda, Sudan, Tanzania, Uganda, and Zambia.

The country is known to be a "geological scandal" because of its vast mineral resources. Nzongola-Ntalaja (2002) describes the mineral wealth of the Democratic Republic of Congo as follows:

> "The Congo has a wide array of minerals including copper, cobalt, tin, zinc, gold, diamonds, iron ore, silver, cadmium, uranium, europium, niobium (or columbite), tantalum and thorium. Some of these minerals are of great strategic value. Uranium, for example, has been used to manufacture nuclear weapons, while rare metals such as niobium and tantalum are greatly needed for space aeronautics in the twenty-first century. According to experts, Africa contains 15 per cent of the world's niobium reserves and 80 per cent of its tantalum deposits. Of these African reserves, the Congo alone has 60 per cent of niobium and 80 per cent of tantalum." (p. 28)

The Democratic Republic of Congo gained its independence from Belgium on June 30, 1960. For 23 years (1885-1908), this country was a personal property of King Leopold of Belgium. From 1908 to 1960, the Free State of Congo, as it was called, was a colony of Belgium. During its 49 years of independence, DRC has only had four presidents: Joseph Kasa Vubu (from 1960 to 1965), Joseph Mobutu (from 1965 to 1997), Laurent Kabila (from 1997 to 2001), and Joseph Kabila (from 2001 to present).

Although the country is rich, its approximately 66 million citizens live in abject poverty. DRC is currently emerging from a 13-year old war which once drew in seven African countries (Rwanda, Uganda, Burundi, Namibia, Angola, Zimbabwe, and Chad). A January 2008 International Rescue Committee survey found that 5,400,000 people have died from war-related causes in Congo since 1998 – the world's deadliest documented conflict since WW II (International Rescue Committee, 2007). There are documented reports of sexual violence used as a weapon of war during the time of that conflict.

It is against this backdrop of political instability that the government of Congo sought to implement a National Information and Communication Infrastructures (NICI) project with the support of UNECA. As could be expected, the project ultimately failed. Clearly, such a large endeavor could have had a significant impact on the national economy and the education system.

Case Studies

Although the adoption of ICT does not work in every country, there is a growing body of research that shows that there is a link between ICT and economic growth. I wish to review three cases that have actually worked and examine the reasons behind the successes.

Let me start with Malaysia. Kuppusamy and Santharappy (2005) demonstrate in a rigorous study that ICT investment is the most significant factor that drove economic growth in Malaysia over the period 1975-2002. ICT investment in Malaysia was able to generate substantial economic benefits in terms of higher productivity and economic growth because of strategic efforts by the government of that country. The study notes that "…heavy industrialization policies and strategic efforts by the government have induced high ICT capital investment over the years" (p. 63). The study concludes that "the development of modern, technically efficient and cost-effective ICT infrastructure is of critical importance

to the establishment of effective communication services in Malaysia" (p. 163). The authors recommend the education sector as key to the success of an effective and efficient ICT implementation in Malaysia.

Senegal is reported to be one of the few countries in Francophone West Africa to recognize the importance of ICT as a tool for achieving "Education For All" goals. Wagner et al (2005) point out that "In Senegal, for example, one of the more economically advanced Francophone countries in this field, parents of pupils do not hesitate to pay the costs related to connection of schools and allowing their children access computer rooms; moreover, even school teachers often oppose going to work in schools with insufficient ICT support" (p. 6). This country, which is much smaller than DRC and has fewer economic resources than DRC, understands that "ICT is good for a school's overall 'health'" (Wagner et al, 2005, p.6). It is worth noting that Senegal has adopted an ICT4E plan while DRC has not yet contemplated even remotely investing in ICT. In secondary schools in Senegal, "ICT already serves as a complement to or has even been integrated into the traditional curriculum" (Wagner et al, 2005, p.6).

The best example of ICT success story comes from Korea. ICT capital contributed 16.3 percent to the output growth of Korea between 1971 and 2000. ICT investment has a strong positive effect on the growth of labor productivity in the long run (Kuppusamy and Santharappy, 2005, p. 151). This great result could not have been possible without a real commitment and serious strategic planning from the government of Korea.

Naturally, it appears that countries that invest strategically in ICT reap significant returns from their investment. ICT can also be used to strengthen democracy development, as is the case in South Africa (Torero and Braun, 2006, p. 5).

Developing a National ICT Plan

The Democratic Republic of Congo explored the possibility of developing National Information and Communication (NICI) policies and plans in 2004. Per its request, a mission was undertaken by United Nations Economic Commission for Africa (UNECA) to meet with Congolese government officials. The concurring consultation workshops allowed them to identify the following priority actions:

1. Establishment of a NICI Committee
2. Monitoring the development of the Presidential Intranet
3. Finalization of the telecommunication reform process
4. Support to the Regulatory Authority for Telecommunication and Post

Despite several consultations between government officials and UNECA representatives, the project did not materialize. It was acknowledged from the onset that the project would take longer time than the normal time usually allotted to NICI projects. Several factors explained the delay in the implementation of the project: the size of the country, the complexity of the administrative setup, and the political diversity (UNECA, 2007). UNECA (2007) acknowledged the failure: “Due to political situation, the process was stalled for several months, however with the new government swearing in around December 2006, it is expected that the NICI process will restart early 2007.” To this date, the NICI process has not been launched yet.

Challenges in implementing a National ICT Plan in DRC

The provision of ICT in the Democratic Republic of Congo may be affected by a number of challenges. Information and Communication Technologies are costly and require a number of conditions to be met (for example, stable supply of electricity, ICT expertise, training, and

equipment maintenance). Yahya (1993) examined some of the problems facing efficient use of information technology in developing countries. “They result from, among other factors, the high costs of imported systems (both hardware and software), the lack of sufficiently trained personnel and deficiencies in the industrial infrastructure.” (p. 349)

Furthermore, many African leaders are known for their unwillingness to spend on education. How can African countries then bridge the digital divide in ICT? Not having a solid group of ICT practitioners and educators can evidently hamper Africa’s efforts in implementing and managing ICT in DRC and in other parts of Africa.

Opoku-Mensah (2008) provides a partial explanation about the reasons that account for a limited pool of ICT practitioners and ICT educators in Africa. She believes that there is a “lack of scientific capacity due to the limited number of trained scientists and researchers in the continent.” She argues that “up to 50,000 African scientists with post-graduate qualifications work outside their mother continent.” Motivo (2005) thinks that “retaining technologically literate staff is not easy in rural setting.” (p.23)

Unwin (2009) addresses the brain drain challenge in Africa. He argues: “Many developing countries get little return from their investment in higher education as too many graduates leave or fail to return home at the end of their studies. This leads to a dwindling professional sector that has a knock-on effect as institutions become increasingly dependent on foreign expertise (p. 207).

The scarce resources allocated to the education sector pose a real challenge for the adoption of ICT. From 1969 to 1975, for example, the national government of DRC spent on average 21.9% of its budget on education. According to Bambanota (2006), the government's spending in education went down drastically from 21.9% in 1975 to only 0.1% in 2000 (p. 5).

Table 1: National Education Budget from 1969 to 2000.

Year	**1969**	**1972**	**1974**	**1975**	**1993**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
%	21.9	22.6	15.5	21.9	0.2	0.2	0.9	0.8	0.2	0.4	0.1

Clearly, there is an educational component that is crucial for ICT design, implementation, and management. In order to have locally trained ICT practitioners, there must be ICT trainers and Career and Technical Education (CTE) facilities properly equipped to host ICT training. In order for the government to commit to investing in ICT infrastructures, tremendous political will is needed. Securing ICT facilities and equipment also requires a great commitment on the part of educational leaders and government officials, especially in a politically unstable environment.

Ayittey (1998) describes this dilemma clearly: "Due to the explosion in the number of satellite dishes, electronic communications (fax machines, the Internet, e-mail, etc.), much more information is available in Africa. The new technology has severely hindered the ability of African dictators to control the flow of information and keep their people in the dark. In their desperate attempts to retain control, defamation or libel suits, heavy fines, and murder have become the choice of corrupt regimes" (p. 232). This may explain why such a wealthy country struggles to jumpstart its economic development.

Wagner et al (2005) argue that “One major limitation for change in ICT and education is that many of those involved in helping people to learn in both formal and non-formal contexts have little or no skills in the appropriate use of new technologies. This is particularly so in poorer countries, and most notably in Africa” (P. 48).

Mativo (2005) explored several challenges that a developing country namely Kenya faces in designing, implementing, and managing an ICT program for the education sector. Like Kenya, the Democratic Republic of Congo faces similar infrastructural and professional challenges. Mativo (2005) cites availability of electricity, retention of technologically literate staff in technical colleges, lack of CTE practitioners and educators, and inadequacy of educational facilities and equipment as the most important challenges. With regards to the availability of electricity, it can be hard to use ICT effectively in the Congo because ICT infrastructures depend heavily on electrical power to run equipment.

Ironically, the whole country is drained by a long river, known as the Congo River. The Congo River is second in the world after the Amazon with respect to hydroelectric potential. It is the second longest river in Africa after The Nile and the fifth longest in the world (Nzongola-Ntalaja 2002, p. 28). D.R. Congo has one of the largest hydroelectric dams (Inga) in the continent. It supplies electricity to several African countries. Yet, inside DRC, electricity is inexistent in many parts of the country, and where it does exist, it is sporadic at best.

Kwenda (2009) recently published an article about this pressing issue. He cites Georges Bokungu who said: “We produce electricity but we manage darkness. We have big energy sources of electricity but only 20 percent of the population has access to electricity because most of the energy is sold to foreign countries” (¶ 1). He added **“**The people in the Bakongo region have seen lines of electricity being put in. These lines pass over their heads. The electricity will be going to Congo-Brazzaville, Zambia and Zimbabwe. For so many years they have seen these electricity lines but they have never seen a lit electric bulb” (¶ 3).

Clearly, developing a national ICT plan is an enormous endeavor. It requires expertise and capital. The first challenge is to create a vision for ICT that is grounded in the realities of the country. The ICT strategic planning committee needs to assess the environment and identify the strengths, weaknesses, opportunities and threats that an ICT plan may pose. It is important to consider the political, economic, social, technological, and legal realities of the country. The committee must also determine the costs associated with ICT infrastructures, maintenance, and training.

Conclusion and Recommendations

The implementation of an effective and efficient national Information and Communication Technology plan in the Democratic Republic of Congo calls for strategic planning. There is no doubt that ICT investment may incur substantial return in terms of economic development and improved educational attainment in that country. However, in the absence of a generic ICT model which can work for all countries, it is imperative that DRC begins by formalizing a strategic and operational plan for the adoption of ICT.

If the Democratic Republic of Congo wants to harness the potential of Information and Communication Technology for economic growth and confront some of the development goals, it needs to revamp its education system and invest seriously in ICT infrastructures. Although there are innumerable challenges associated with the implementation of a national ICT plan, strategic thinking is paramount for the materialization of ICT goals in the Democratic Republic of Congo.

Ultimately, these challenges can be overcome through the realization that political, social, and economic transformations of the country are contingent on the revamping of the education system and the adoption of information and communication systems. Unfortunately, ICT may bring discomfort to Congolese leaders and to many African leaders who are intent on restricting the flow of information. This may, perhaps, explain partly why the Democratic Republic of Congo has not embraced yet information and communication technologies as motor for its development.

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Mativo, J. M. (2005). The Challenges of Teaching Technology in a Developing Nation. *TechDirections*. December, pp. 22 – 25. http://www.techdirections.com

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Torero, M. & Braun, J.V. (2005). Information and communication technologies for the poor. International Food Policy Research Institute. 1-5. Washington, DC: Retrieved August 08, 2009.

UNECA. 2007. National information and communication infrastructure (nici) policies and plans (e-strategies). United Nations Economic Commission for Africa (UNECA). Retrieved July 31, 2009 from http://www.uneca.org/aisi/nici/drc/drc.htm.

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http://www.infodev.org/files/2942_file_M_E_ICT_Education_draft_WSIS_optimized.pdf

Yahya A.H. (1993). On the Problems of Information Technology Management in Developing Nations; *Proceedings of The Conference of the ACM Special Interest Group on Computer Personnel Research ACM SIGCPR 93*; St. Louis, Missouri, U.S.A. April 1--3, 1993. The ACM Digital Library. Retrieved July 30, 2009.

Annotated Bibliography

This annotated bibliography contains references related to the research contained in the preparation of this paper.

Ayittey, G.B.N. (1998). Africa in chaos. New York: St. Martin's Press, Scholarly and Reference Division.

The book "*Africa in Chaos*" by George B.N. Ayittey, a distinguished economist and native of Ghana, explores social, economic and political plights that plague the continent of Africa. He analyzes the real causes of economic and social disasters of Africa. This book will help me discuss the challenges that many African countries including the Democratic Republic of Congo face.

Bambanota, G. M. (2006). L'école congolaise de demain: quelles chances et quels défis? *L'école Démocratique*. Retrieved September 15, 2009 from http://www.skolo.org/spip.php?article355&lang=fr

Professor Gratien Mokonzi Bambanota teaches at the school of education at Universite de Kisangani in the Democratic Republic of Congo. He has published numerous articles and a few books on the challenges facing the education system in the Democratic Republic of Congo. This article provides information about government expenditures on education.

Jun, T. (2005). Information and communication technologies for enterprises growth and development. *ICEC* 2005: 904-906. Retrieved August 08, 2009.

The article studies the effects of Information and Communication Technologies on enterprises. The author argues that success in today's economy rests on sound business practices and effective use and management of Information Technology (IT) resources. He recommends a framework for enterprises growth and development. The article will hence provide solid information about the possible link between economy and ICTs.

International Rescue Committee. *2009.* IRC annual report 2008. Retrieved September 15, 2009 from http://www.theirc.org/special-reports/special-report-congo.

The International Rescue Committee has been an important non government organization which offers humanitarian relief to war-torn areas for more than 75 years. The organization has earned international recognization and trust because of the quality of work it does. It addresses, among other things, the root causes of violence. It has been monitoring the war situation in the Congo since 1996. It is a useful resource.

Internet World Stats. Usage and Population Statistics. 2009. Internet usage statistics for Africa. http://www.internetworldstats.com/stats1.htm. Retrieved September 15, 2009.

Internet World Stats is an International website that features up to date world Internet Usage, Population Statistics and Internet Market Research Data, for over 233 individual countries and world regions. It is a useful resource for Internet usage around the world and in Africa.

Kuppusamy M. and Santhapparathy, S. A., 2005. Investment in information and communication technologies (ict) and its payoff in Malaysia. *Perspectives on Global Development and*

Technology, 4(2), 147-167. Koninklijke Brill NV, Leiden. Retrieved September 10, 2009.

This article examines the impact of ICT on Malaysian economic growth over the period 1975-2002. The study revealed that ICT had contributed positively to Malaysia's economic growth over the study period. The authors also make some policy recommendations on how Malaysia can achieve better economic growth by leveraging of ICT. It is a great of information on the potential of ICT for economic growth.

Kwenda, S. (2009, September 17). DRC: Electricity lines overhead but never seen a light bulb. *Open Society Initiative for Southern Africa*. Inter Press Service News Agency (IPS). Retrieved on September 26, 2009 from http://ipsnews.net/africa/nota.asp?idnews=48495

This article raises serious questions about the management of electrical power supply by the national government. It highlights the root causes of the problem and points out the reasons why local populations are growing more and more dissatisfied with the lack of appropriate and fair system for electricity distribution and management.

Mativo, J. M. (2005). The challenges of teaching technology in a developing nation. *TechDirections*. December pp. 22 – 25. http://www.techdirections.com

In 2003, John M. Mativo, an assistant professor of technological studies at Ohio Northern University, conducted a study on "The Challenge of Teaching Technology in a Developing Nation". He published that study in the December 2005 edition of TechDirections, a magazine

that aims at linking education to careers. His article explores several challenges that a developing country namely Kenya faces in designing, implementing, and managing ICT for the education sector. Since Kenya has a lot of the same infrastructural and professional problems as the Democratic Republic of Congo, this article is enlightening in that respect.

Nzongola-Ntalaja, G. (2002). The Congo from Leopold to Kabila: A People's History. *Zed Books Ltd*. London: UK.

This book offers fresh perspectives on the situation in the Democratic Republic of Congo and in the Great Lakes region of Africa. It provides insights into the violent and tragic political history of the vast territory of the Congo from the 1870s to the present day. The author is a leading scholar on the history of Africa and teaches African Studies at the University of North Carolina at Chapel Hill. He taught at Howard University in the past. This is useful resource for information about the Democratic Republic of Congo.

OECD. (2009). Guide to measuring the information society, 2009. *The Organization for Economic Cooperation and Development (OECD)*. Paris, France. Retrieved August 07, 2009 from http://new.unctad.org/templates/Page____749.aspx

This report was initially published in 2005. It suggests a number of statistical standards for measuring various aspects of Information and Communication Technology (ICT) in OECD member countries. This report will be very useful for my final paper because it describes the ICT indicators used for measuring ICT for development, for measuring the impacts of an ICT sector, and for measuring e-business in countries across the globe.

Opoku-Mensah, A. (2008). The role of science and technology in the knowledge economy: the role of the African private sector support for investment in ICT R & D. *UN Economic Commission for Africa (UNECA)***.** Retrieved July 31, 2009 from http://www.uneca.org/istd/resources/istd-resource-2008120002-en.asp

This article was published by the United Nations Economic Commission for Africa. It explores the role of science and ICT in the knowledge economy. It points out some of the challenges (including brain drain) that hinder the development of Africa.

The Global Information Society: a Statistical View. (2008). *Global event on measuring the Information Society*. Organized by Partnership on measuring ICT for development. Palais des Nations, Geneva. May 27-29, 2008. Retrieved from August 1, 2009 from http://www.unctad.org/en/docs/LCW190_en.pdf

This report was put together by representatives from developing countries. It reviewed standards (ICT indicators) for collecting statistics on information and communication technologies (ICTs) to spur social and economic development. It also provides a summary of the current status of ICT measurement worldwide. This resource will show where some African countries including the Democratic Republic of Congo stand with regards to ICT implementation.

Torero, M. & Braun, J.V. (2006). Information and communication technologies for development and poverty reduction: The potential of telecommunications. *International Food Policy Research Institut*e. Washington, DC.

The book is particularly enlightening. It highlights the link between ICT growth and economic growth within a context of poverty and suggests a conceptual model. It assesses the potential for ICTs to promote economic growth that benefits the poor. This is a good reference resource for studying the potential benefits of ICTs in developing countries.

UNECA. 2007. National information and communication infrastructure (nici) policies and plans (e-strategies). *United Nations Economic Commission for Africa (UNECA).* Retrieved July 31, 2009 from http://www.uneca.org/aisi/nici/drc/drc.htm.

The United Nations Economic Commission for Africa (UNECA) describes the National Information and Communication Infrastructure (NICI) project it undertook in the Congo with the participation of government officials. This resource briefly outlines the goals of the project and the challenges it faced.

Unwin, T. (ed.). (2009). ICT4D. Information and communication technology for development. *Cambridge*: Cambridge University Press.

ICT4D provides an authoritative and accessible account of the use of Information and Communication Technologies (ICTs) in contemporary development practice. It combines theory with practical guidance - including both a conceptual framework for understanding the rapid development of ICT4D. It highlights the role of ICTs for economic development, especially in developing countries. It explores both the successes and the challenges facing such initiatives. It is a very important reference.

Wagner, D.A., Day, B., James, T., Kozma, R.B., Miller, J. & Unwin, T. (2005). Monitoring and Evaluation of ICT in Education Projects. A Handbook for Developing Countries. Washington DC: *Information for Development Program (InfoDev)*. Retrieved August 1, 2009 from http://www.infodev.org/files/2942_file_M_E_ICT_Education_draft_WSIS_optimized.pdf

This handbook provides policymakers in developing countries with monitoring and evaluation strategies for a successful implementation of Information and Communication Technology For Education (ICT4E) initiatives. This is a great resource for issues related to the introduction of ICTs in educational settings in developing countries.

Yahya A.H. (1993). On the Problems of Information Technology Management in Developing Nations; *Proceedings of The Conference of the ACM Special Interest Group on Computer Personnel Research ACM SIGCPR 93*; St. Louis, Missouri, U.S.A. April 1--3, 1993. The ACM Digital Library. Retrieved July 30, 2009.

"On the Problems of Information Technology Management in Developing Nations" discusses the challenges that many developing countries face as they try to manage Information Technology resources. It also demonstrates how information technology has a great potential for the economic development of third world countries. This article can be a valuable tool for examining generic computerization challenges that developing countries face.